



TEST REPORT

Reference No. : WTX24X12296736W009
Manufacturer : Lumi United Technology Co., Ltd.
Address : Room 801-804, Building 1, Chongwen Park, Nanshan iPark, No. 3370, Liuxian Avenue, Fuguang Community, Taoyuan Residential District, Nanshan District, Shenzhen, China
Product Name : Chime Repeater
Model No. : CH-C11E
Standards : ETSI EN 301 489-1 V2.2.3 (2019-11)
ETSI EN 301 489-3 V2.3.2 (2023-01)
ETSI EN 301 489-17 V3.3.1 (2024-09)
Date of Receipt sample : 2024-12-16
Date of Test : 2024-12-16 to 2025-02-19
Date of Issue : 2025-02-19
Test Report Form No. : WTX_ESIEN301489_1_2019W
Test Result : Pass

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of approver.

Prepared By:

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Jason Su/ Manager



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Report version

Version No.	Date of issue	Description
Rev.00	2025-02-19	Original
/	/	/

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

General Description of EUT	
Product Name:	Chime Repeater
Trade Name:	Aqara
Model No.:	CH-C11E
Adding Model(s):	CH-C11D
Rated Voltage:	DC5V
Battery Capacity:	/
Adapter Model:	/
Software Version:	/
Hardware Version:	/

Note: The test data is gathered from a production sample provided by the manufacturer. The appearance of others models listed in the report is different from main-test model CH-C11E, but the circuit and the electronic construction do not change, declared by the manufacturer.

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Technical Characteristics of EUT	
Wi-Fi(2.4GHz)- FPC Antenna 1	
Support Standards:	802.11b, 802.11g, 802.11n-HT20
Frequency Range:	2412-2472MHz for 802.11b/g/n(HT20)
Max.RF Output Power:	16.49dBm (EIRP)
Type of Modulation:	CCK, OFDM, QPSK, BPSK, 16QAM, 64QAM
Quantity of Channels	13 for 802.11b/g/n(HT20)
Channel Separation:	5MHz
Type of Antenna:	FPC Antenna
Antenna Gain:	0dBi
Wi-Fi(2.4GHz)- FPC Antenna 2	
Support Standards:	802.11b, 802.11g, 802.11n-HT20
Frequency Range:	2412-2472MHz for 802.11b/g/n(HT20)
Max.RF Output Power:	16.76dBm (EIRP)
Type of Modulation:	CCK, OFDM, QPSK, BPSK, 16QAM, 64QAM
Quantity of Channels	13 for 802.11b/g/n(HT20)
Channel Separation:	5MHz
Type of Antenna:	FPC Antenna
Antenna Gain:	0dBi
Wi-Fi(5GHz)	
Support Standards:	802.11a, 802.11n-HT20/40, 802.11ac(HT20/40/80)
RF Output Power	Max. 17.61dBm (EIRP)
Frequency Range:	Band 1: 5180-5240MHz
Modulation:	BPSK, QPSK,16QAM, 64QAM
Antenna Type:	FPC Antenna
Antenna Gain:	0.5dBi
Wi-Fi(5.8GHz)	
Support Standards:	802.11a, 802.11n(HT20/40); 802.11ac-VTH20/40/80
RF Output Power	Max. 13.65dBm (EIRP)
Frequency Range:	5745-5825MHz
Modulation:	BPSK, QPSK,16QAM,64QAM,256QAM
Antenna Type:	FPC Antenna
Antenna Gain:	0.5dBi
ZigBee	
Frequency Range:	2405MHz-2480MHz
Max.RF Output Power:	7.79dBm (EIRP)
Modulation:	QPSK
Quantity of Channels:	16
Channel Separation:	5MHz
Type of Antenna:	FPC Antenna



Antenna Gain:	1dBi
Thread	
Frequency Range:	2405MHz-2480MHz
Max.RF Output Power:	8.02dBm (EIRP)
Modulation:	QPSK
Quantity of Channels:	16
Channel Separation:	5MHz
Type of Antenna:	FPC Antenna
Antenna Gain:	1dBi
Bluetooth	
Bluetooth Version:	Bluetooth V5.0(BLE Mode)
Frequency Range:	2402MHz-2480MHz
Max.RF Output Power:	9.39dBm (EIRP)
Type of Modulation:	GFSK
Data Rate:	1Mbps
Quantity of Channels	40
Channel Separation:	2MHz
Type of Antenna:	FPC Antenna
Antenna Gain:	0dBi

Note: The Antenna Gain is provided by the customer and can affect the validity of results.



1.2 Test Standards

The tests were performed according to following standards:

ETSI EN 301 489-1 V2.2.3 (2019-11): Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard for Electromagnetic Compatibility

ETSI EN 301 489-3 V2.3.2 (2023-01): ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short Range Devices (SRD) operating on frequencies between 9 kHz and 246 GHz; Harmonised Standard for ElectroMagnetic Compatibility

ETSI EN 301 489-17 V3.3.1 (2024-09): ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband and Wideband Data Transmission Systems; Harmonised Standard for ElectroMagnetic Compatibility.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product maybe which result in lowering the emission/immunity should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with the standard ETSI EN 301489-1, Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements.

1.4 Test Facility

Address of the test laboratory

Laboratory: Waltek Testing Group (Shenzhen) Co., Ltd.

Address: 1/F., Room 101, Building 1, Hongwei Industrial Park, Liuxian 2nd Road, Block 70 Bao'an District, Shenzhen, Guangdong, China

FCC – Registration No.: 125990

Waltek Testing Group (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. The Designation Number is CN5010, and Test Firm Registration Number is 125990.

Industry Canada (IC) Registration No.: 11464A

The 3m Semi-anechoic chamber of Waltek Testing Group (Shenzhen) Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.



1.5 EUT Setup and Operation Mode

The equipment under test (EUT) was configured to measure its highest possible emission/immunity level. The test modes were adapted according to the operation manual for use, more detailed description as follows:

Test Mode List			
Test Mode	Description	Remark	
TM1	Normal working	Connect the Adapter; Connected doorbell works	
TM2	Wi-Fi (2.4GHz)	TR, CR, TT, CT for EMS testing	
TM3	Wi-Fi (5GHz)	TR, CR, TT, CT for EMS testing	
TM4	Wi-Fi (5.8GHz)	TR, CR, TT, CT for EMS testing	
TM5	Bluetooth	TR, CR, TT, CT for EMS testing	
TM6	Zigbee	TR, CR, TT, CT for EMS testing	
TM7	Thread	TR, CR, TT, CT for EMS testing	

Note: Activate simultaneous transmission in all possible configurations during the testing, and the report only shows the worst case data.

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
USB Cable	1.0	Shielded	Without Ferrite

Description	Manufacturer	Model	Serial Number
Doorbell Camera Hub	Lumi	CH-C09E	/
Adapter	Xiaomi	MDY-08-EH	/



1.6 Performance Criteria for EMS

➤ EN 301 489-3, The performance criteria are:

The performance criteria are used to make an assessment whether a radio equipment passes or fails immunity tests.

Only the performance criteria specified in the present document or in ETSI EN 301 489-1 [1] where referenced shall apply.

The provisions of ETSI EN 301 489-1 [1] clause 6 shall apply, together with clauses 6.2 and 6.3 of the present document.

Continuous and non-continuous operation

Latency is the time delay between the initiation and the completion of operation of the EUT. Correct functioning requires completing the relevant operation within the maximum latency time.

Where the maximum latency is specified in the applicable harmonised radio standard (in the wanted performance criterion, or an acknowledge requirement), that value shall be used.

Where this is not the case, then the maximum latency is that required by the intended use of the EUT.

Operating modes

Where the EUT has more than one mode of operation (see clause 4.4.1), an unplanned transition from one mode to another is considered as an unintentional response. The EUT shall be tested in all modes to confirm there are no such unintentional responses



➤ **EN 301 489-17, The performance criteria are:**

- performance criteria A for immunity tests with phenomena of a continuous nature;
- performance criteria B for immunity tests with phenomena of a transient nature;
- performance criteria C for immunity tests with power interruptions exceeding a certain time.

The equipment shall meet the minimum performance criteria as specified in the following clauses.

Table 1: Performance criteria

Criteria	During test	After test
A	Shall operate as intended. (see note 1). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance (see note 3). Shall be no loss of function. Shall be no loss of stored data or user programmable
B	May show loss of function (one or more). May show degradation of performance (see note 2). Shall be no unintentional transmissions.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no degradation of performance (see note 3). Shall be no loss of stored data or user programmable functions.
C	May be loss of function (one or more).	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no degradation of performance (see note 3).
NOTE 1: Operate as intended during the test allows a level of degradation not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.		
NOTE 2: Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.		
NOTE 3: No degradation of performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.		



➤ **Monitoring EUT in Immunity Test:**

Monitoring for Continuous Phenomena Applied to EUT

Wi-Fi

The communication link should be maintained and there should be no loss of data packets during the test.

In addition to confirming the above performance during a communication, the test is also been performed in idle mode, with an interference receiver to monitor if the transmitter unintentionally operates.

For equipment that supports a PER or FER, the minimum performance level shall be a PER or FER less than or equal to 10 %.

For equipment that does not support a PER or a FER, the minimum performance level shall be no loss of the wireless transmission function needed for the intended use of the equipment.

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1.7 Measurement Uncertainty

Measurement uncertainty	
Parameter	Uncertainty
Uncertainty for Radiated Emission in 3m chamber	@30-200MHz $\pm 4.52\text{dB}$ @0.2-1GHz $\pm 5.56\text{dB}$ @1-6GHz $\pm 3.84\text{dB}$ @6-18GHz $\pm 3.92\text{dB}$
Uncertainty for Conducted Emission	@9-150kHz $\pm 3.74\text{dB}$ @0.15-30MHz $\pm 3.34\text{dB}$
Uncertainty for Harmonic test	3.26%
Uncertainty for Flicker test	4.76%
Uncertainty for RS test	21%, k=2
Uncertainty for CS test	29%, k=2
Uncertainty for ESD test	The immunity measurement system uncertainty is within standard requirement and is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%.
Uncertainty for EFT test	
Uncertainty for Surges test	
Uncertainty for Voltage Dips, Voltage Variations and Short Interruptions Test	
Uncertainty for PFMF test	



1.8 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal Date	Due Date
Universal Radio Communication Tester	Rohde & Schwarz	CMW500	148650	2024-02-27	2025-02-26
<input checked="" type="checkbox"/> Radiated emissions (30MHz-1GHz)					
Coaxial Cable (below 1GHz)	Lair Microwave	LE400-NMNM-8M	#02	2025-01-15	2026-01-10
Broadband Preamplifier (9KHz-6GHz)	SCHWARZBECK	BBV9744	00140	2025-01-11	2026-01-10
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	01376	2025-01-11	2026-01-10
Test Receiver (9KHz-7GHz)	R&S	ESR 7	102320	2025-01-10	2026-01-09
Test Software	Frad Technology	EZ-EMC(Ver.E MEC-3A1)	/	/	/
<input type="checkbox"/> Chamber A: Below 1GHz					
Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2024-02-24	2025-02-23
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2024-03-19	2025-03-18
Amplifier	HP	8447F	2805A03475	2024-02-24	2025-02-23
Loop Antenna	Schwarz beck	FMZB 1516	9773	2024-02-26	2025-02-25
Trilog Broadband Antenna	Schwarz beck	VULB9163	9163-333	2024-02-24	2025-02-23
Coaxial Cable	/	RC_6G-N-M	/	2024-03-15	2025-03-14
Coaxial Cable	/	RC_6G-N-M	/	2024-03-15	2025-03-14
Coaxial Cable	/	RC_6G-N-M	/	2024-03-15	2025-03-14
<input type="checkbox"/> Chamber A: Above 1GHz					
Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2024-02-24	2025-02-23
Spectrum Analyzer	Rohde & Schwarz	FSP40	100612	2024-02-24	2025-02-23
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2024-03-19	2025-03-18
Amplifier	C&D	PAP-1G18	2002	2024-02-27	2025-02-26
Horn Antenna	ETS	3117	00086197	2024-02-26	2025-02-25
DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2024-03-17	2025-03-16
Pre-amplifier	Schwarzbeck	BBV 9721	9721-031	2024-02-29	2025-02-28
Coaxial Cable	/	C16-07-07	/	2024-03-15	2025-03-14
Coaxial Cable	/	C16-07-07	/	2024-03-15	2025-03-14
Coaxial Cable	/	C16-07-07	/	2024-03-15	2025-03-14
<input type="checkbox"/> Chamber B:Below 1GHz					
Trilog Broadband	Schwarz beck	VULB9163(B)	9163-635	2024-03-17	2027-03-16

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Antenna					
Amplifier	Agilent	8447D	2944A10457	2024-02-24	2025-02-23
EMI Test Receiver	Rohde & Schwarz	ESPI	101391	2024-02-24	2025-02-23
Coaxial Cable	/	1.5MRFC-LWB3	/	2024-07-03	2025-07-02
Coaxial Cable	/	RG 316	/	2024-07-03	2025-07-02
Coaxial Cable	/	RG 316	/	2024-07-03	2025-07-02
<input type="checkbox"/> Chamber C: Below 1GHz					
EMI Test Receiver	Rohde & Schwarz	ESIB 26	100401	2024-02-27	2025-02-26
Trilog Broadband Antenna	Schwarz beck	VULB 9168	1194	2024-04-18	2027-04-17
Loop Antenna	Schwarz beck	FMZB 1516	9773	2024-02-26	2025-02-25
Amplifier	HP	8447F	2944A03869	2024-02-24	2025-02-23
Coaxial Cable	/	RC_6G-N-M	/	2024-07-03	2025-07-02
Coaxial Cable	/	RC_6G-N-M	/	2024-07-03	2025-07-02
Coaxial Cable	/	RC_6G-N-M	/	2024-07-03	2025-07-02
<input checked="" type="checkbox"/> Chamber C: Above 1GHz					
EMI Test Receiver	Rohde & Schwarz	ESIB 26	100401	2024-02-27	2025-02-26
Horn Antenna	POAM	RTF-118A	1820	2023-03-10	2026-03-09
Amplifier	Tonscend	TAP01018050	AP22E806235	2024-02-27	2025-02-26
DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2024-03-17	2025-03-16
Pre-amplifier	Schwarzbeck	BBV 9721	9721-031	2024-02-29	2025-02-28
Coaxial Cable	/	RC-18G-N-M	/	2024-07-03	2025-07-02
Coaxial Cable	/	RC-18G-N-M	/	2024-07-03	2025-07-02
Coaxial Cable	/	RC-18G-N-M	/	2024-07-03	2025-07-02
<input type="checkbox"/> Conducted Room 1#					
EMI Test Receiver	Rohde & Schwarz	ESCI	100525	2024-12-08	2025-12-07
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2024-02-24	2025-02-23
AC LISN	Schwarz beck	NSLK8126	8126-279	2024-02-24	2025-02-23
8-WIRE ISN CAT5	Schwarz beck	8158	CAT5-8158-0117	2024-02-24	2025-02-23
Coaxial Cable	/	RG 316	/	2024-07-03	2025-07-02
Coaxial Cable	/	6MRFC-DP	/	2024-07-03	2025-07-02
<input checked="" type="checkbox"/> Conducted Room 2#					
EMI Test Receiver	Rohde & Schwarz	ESPI	101259	2024-02-24	2025-02-23
LISN	Rohde & Schwarz	ENV 216	100097	2024-02-24	2025-02-23
Coaxial Cable	/	RG 316	/	2024-07-03	2025-07-02
PFMF					
PMF Generator	LIONCEL	PMF-801C-C	0171101	2024-02-24	2025-02-23
PMF Antenna	LIONCEL	PMF-801C-A	0180302	2024-02-24	2025-02-23
Instantaneous PMF Generator Module	LIONCEL	PMF-801C-T	0171001	2024-02-24	2025-02-23



H/F					
Digital Power Analyzer	California Instrument	CTS	72831	2024-02-24	2025-02-23
Power Source	California Instrument	5001IX-CTS-400	60077	2024-02-24	2025-02-23
ESD					
ESD Generator	LIONCEL	ESD-203B	0170901	2024-02-26	2025-02-25
EFT/SURGE/DIPS					
Transient 2000	EMC PARTNER	TRA2000	836	2024-03-19	2025-03-18
Couple Clamp	EMC PARTNER	CN-EFT1000	513	2024-03-19	2025-03-18
CS					
CONDUCTED IMMUNITY TEST SYSTEM	FRANKONIA	CIT-10/75	126B1247/2013	2024-02-27	2025-02-26
Attenuator	EMTEST	MA-5100/6BF2	1009	2024-02-27	2025-02-26
CDN	Luthi	L-801M2/M3	2665	2024-02-27	2025-02-26
CDN	LIONCEL	CDN-T8	0210401	2024-02-24	2025-02-23
EM Clamp	TESEQ	KEMZ801A	45028	2024-02-26	2025-02-25
RS					
Audio Analyzer	Rohde & Schwarz	UPV	1146.2003K02-10 1782-XP	2024-02-27	2025-02-26
Signal Generator	HP	8665B	3438A00604	2024-02-27	2025-02-26
Power Sensor	Agilent	E9301A	MY52450001	2024-02-27	2025-02-26
Power Sensor	Agilent	E9304A	MY55081055	2024-02-27	2025-02-26
RF Power Amplifier	MicoTop	MPA-80-1000-2 50	MPA1906239	2024-02-27	2025-02-26
RF Power Amplifier	MicoTop	MPA-80-6000-1 00	MPA1906238	2024-02-27	2025-02-26
Antenna	SCHWARZBECK	STLP 9129	9129 114	N/A	N/A
Power Meter	Agilent	E4419B	GB42420578	2024-02-27	2025-02-26



Software List			
Description	Manufacturer	Model	Version
EMI Test Software (Radiated Emission A)*	Farad	EZ-EMC	RA-03A1 (1.1.4.2)
EMI Test Software (Radiated Emission B)*	Farad	EZ-EMC	RA-03A1 (1.1.4.2)
EMI Test Software (Radiated Emission C)*	Farad	EZ-EMC	RA-03A1-2 (1.1.4.2)
EMI Test Software (Conducted Emission Room 1#)*	Farad	EZ-EMC	3A1*CE-RE 1.1.4.3
EMI Test Software (Conducted Emission Room 2#)*	Farad	EZ-EMC	3A1*CE-RE 1.1.4.3

*Remark: indicates software version used in the compliance certification testing.

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2. SUMMARY OF TEST RESULTS

Standards	Reference	Description of Test Item	Result
ETSI EN 301 489-1	8.2	Radiated Emissions	Pass
	8.3	Conducted Emissions for DC Power Port	N/A
	8.4	Conducted Emissions for AC Power Port	Pass
	8.5	Harmonic Current Emissions	Pass
	8.6	Voltage Fluctuations and Flicker	Pass
	8.7	Telecommunication Ports	N/A
	9.2	Radio Frequency Electromagnetic Field	Pass
	9.3	Electrostatic Discharge	Pass
	9.4	Fast Transients, Common Mode	Pass
	9.5	Radio Frequency, Common Mode	Pass
	9.6	Transient and Surges in the Vehicular Environment	N/A
	9.7	Voltage Dips and Interruptions	Pass
	9.8	Surges	Pass
Pass: The EUT complies with the essential requirements in the standard. Fail: The EUT does not comply with the essential requirements in the standard. N/A: Not applicable.			

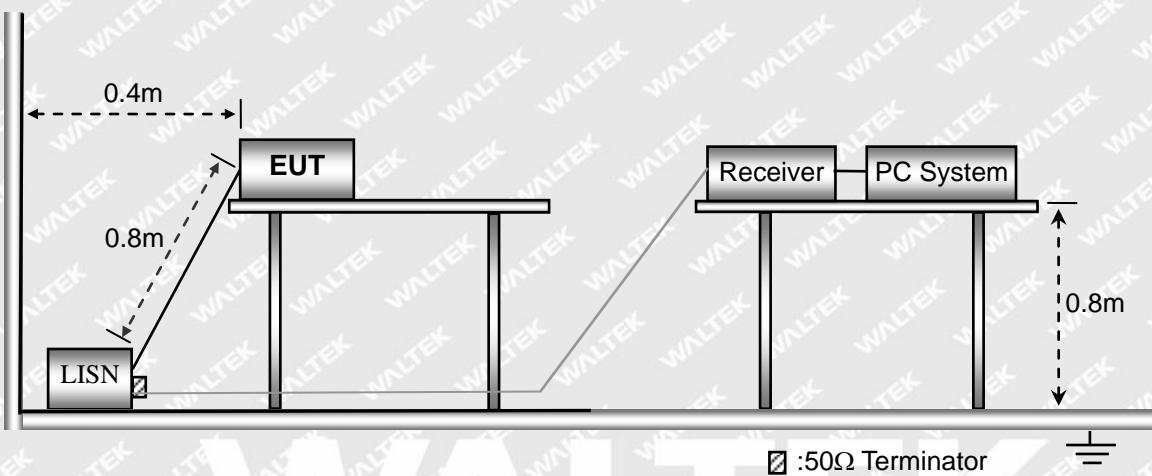


3. Conducted Emissions

3.1 Test Procedure

Test is conducting under the description of EN55032 Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement.

3.2 Basic Test Setup Block Diagram

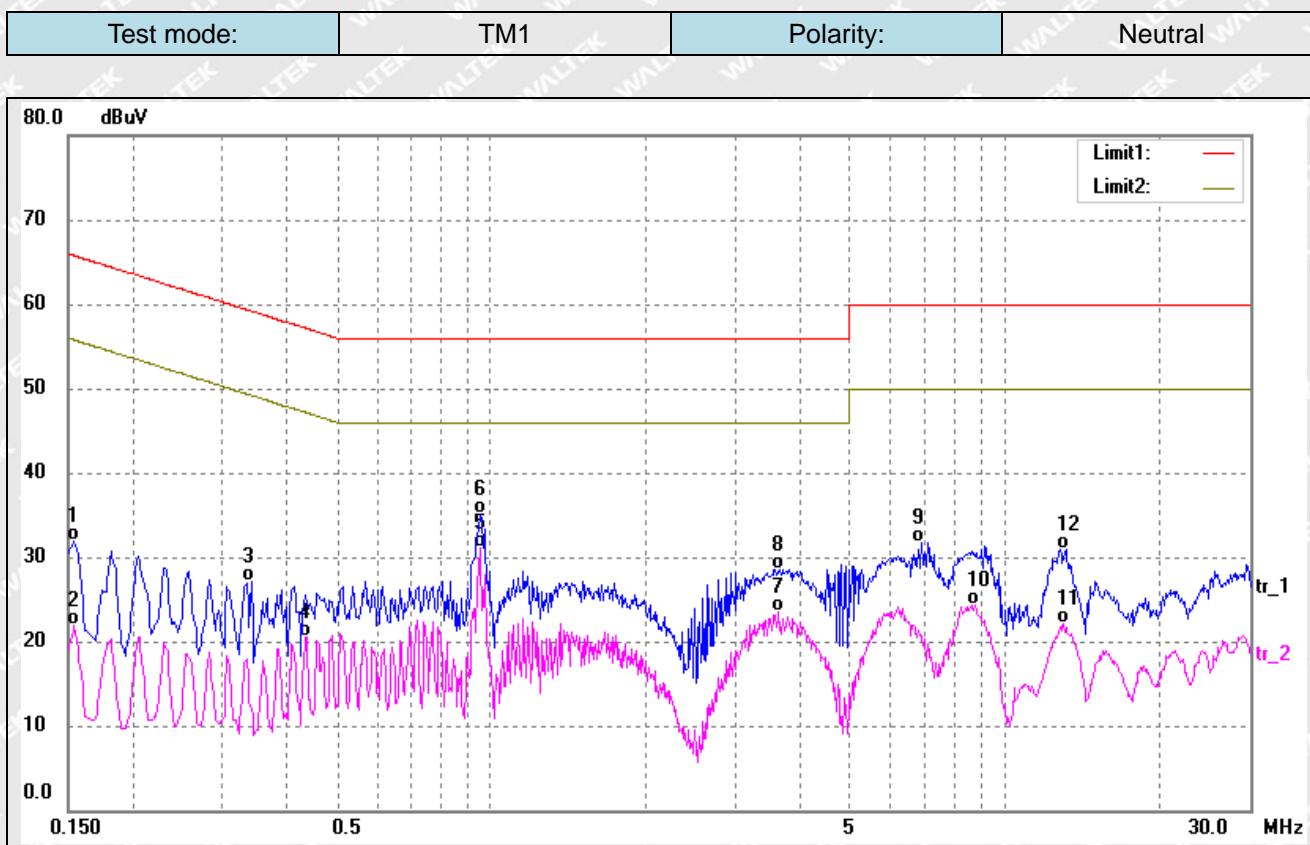


3.3 Environmental Conditions

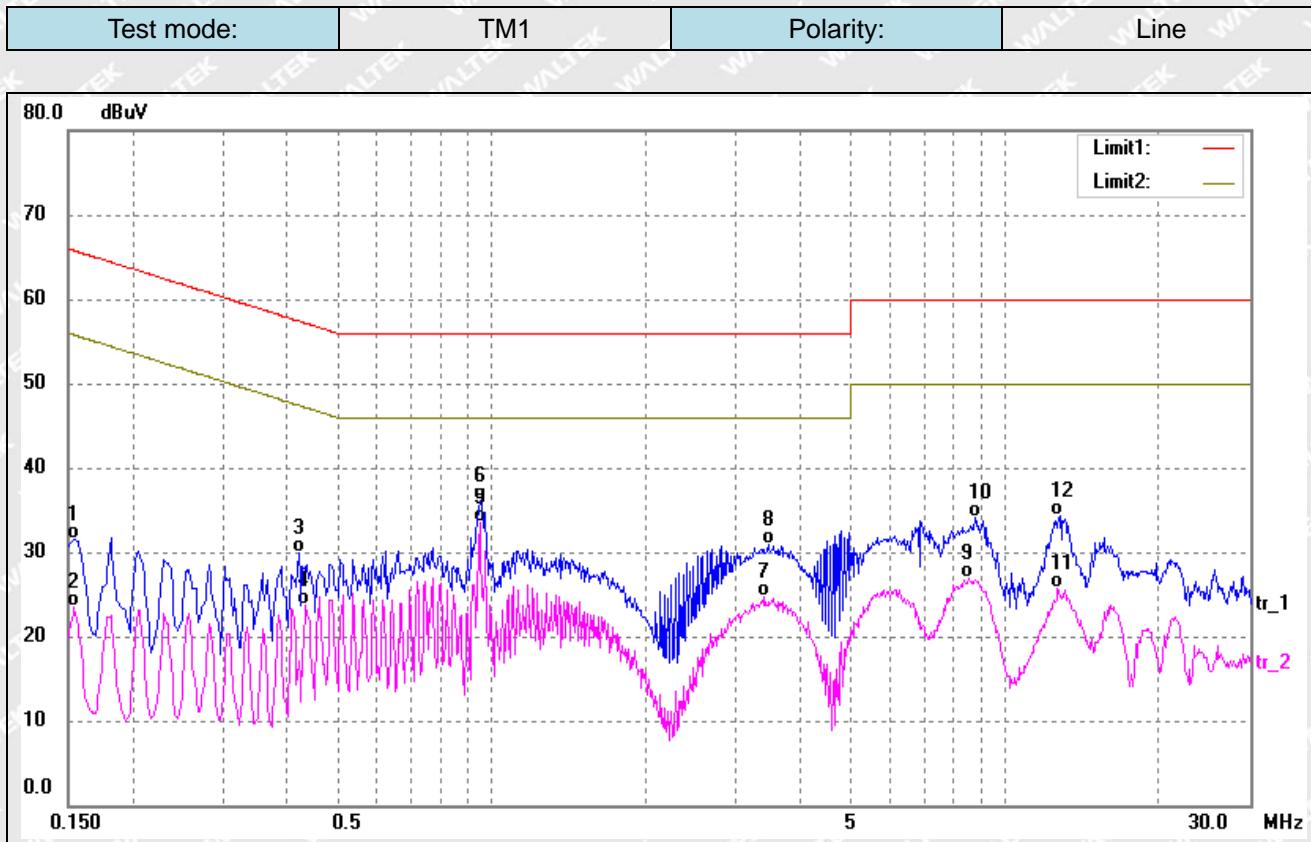
Temperature:	22 ° C
Relative Humidity:	55 %
ATM Pressure:	1015 mbar

3.4 Conducted Emissions Test Data

Note: Only show the worst case in the test report



No.	Frequency (MHz)	Reading (dB _{uV})	Correct (dB)	Result (dB _{uV})	Limit (dB _{uV})	Margin (dB)	Detector
1	0.1539	21.97	9.99	31.96	65.78	-33.82	QP
2	0.1539	11.87	9.99	21.86	55.78	-33.92	AVG
3	0.3420	17.15	9.97	27.12	59.15	-32.03	QP
4	0.4340	10.60	9.98	20.58	47.18	-26.60	AVG
5*	0.9500	21.08	10.00	31.08	46.00	-14.92	AVG
6	0.9540	25.02	10.00	35.02	56.00	-20.98	QP
7	3.6340	13.28	10.13	23.41	46.00	-22.59	AVG
8	3.6580	18.43	10.13	28.56	56.00	-27.44	QP
9	6.8820	21.44	10.28	31.72	60.00	-28.28	QP
10	8.7660	13.95	10.40	24.35	50.00	-25.65	AVG
11	13.0260	11.29	10.72	22.01	50.00	-27.99	AVG
12	13.1420	20.17	10.73	30.90	60.00	-29.10	QP



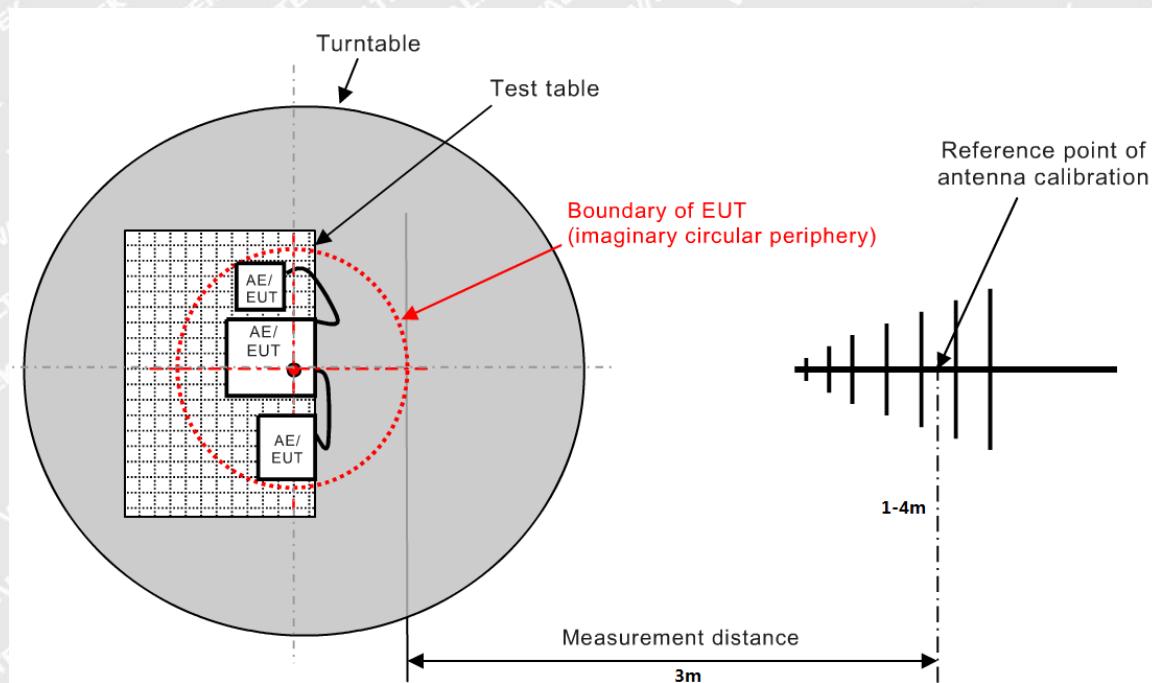
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1539	21.63	9.97	31.60	65.78	-34.18	QP
2	0.1539	13.50	9.97	23.47	55.78	-32.31	AVG
3	0.4220	19.97	9.95	29.92	57.41	-27.49	QP
4	0.4340	13.70	9.95	23.65	47.18	-23.53	AVG
5*	0.9500	23.48	9.97	33.45	46.00	-12.55	AVG
6	0.9540	26.22	9.97	36.19	56.00	-19.81	QP
7	3.4020	14.72	10.05	24.77	46.00	-21.23	AVG
8	3.4700	20.88	10.05	30.93	56.00	-25.07	QP
9	8.5460	16.57	10.29	26.86	50.00	-23.14	AVG
10	8.7700	23.79	10.30	34.09	60.00	-25.91	QP
11	12.7140	15.05	10.59	25.64	50.00	-24.36	AVG
12	12.8060	23.67	10.60	34.27	60.00	-25.73	QP



4. Radiated Emissions

4.1 Test Procedure

Test is conducted under the description of EN55032 Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement.



4.2 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of $-6\text{dB}\mu\text{V}$ means the emission is $6\text{dB}\mu\text{V}$ below the maximum limit for Class B device. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{EN 301489 Class B Limit}$$



4.3 Environmental Conditions

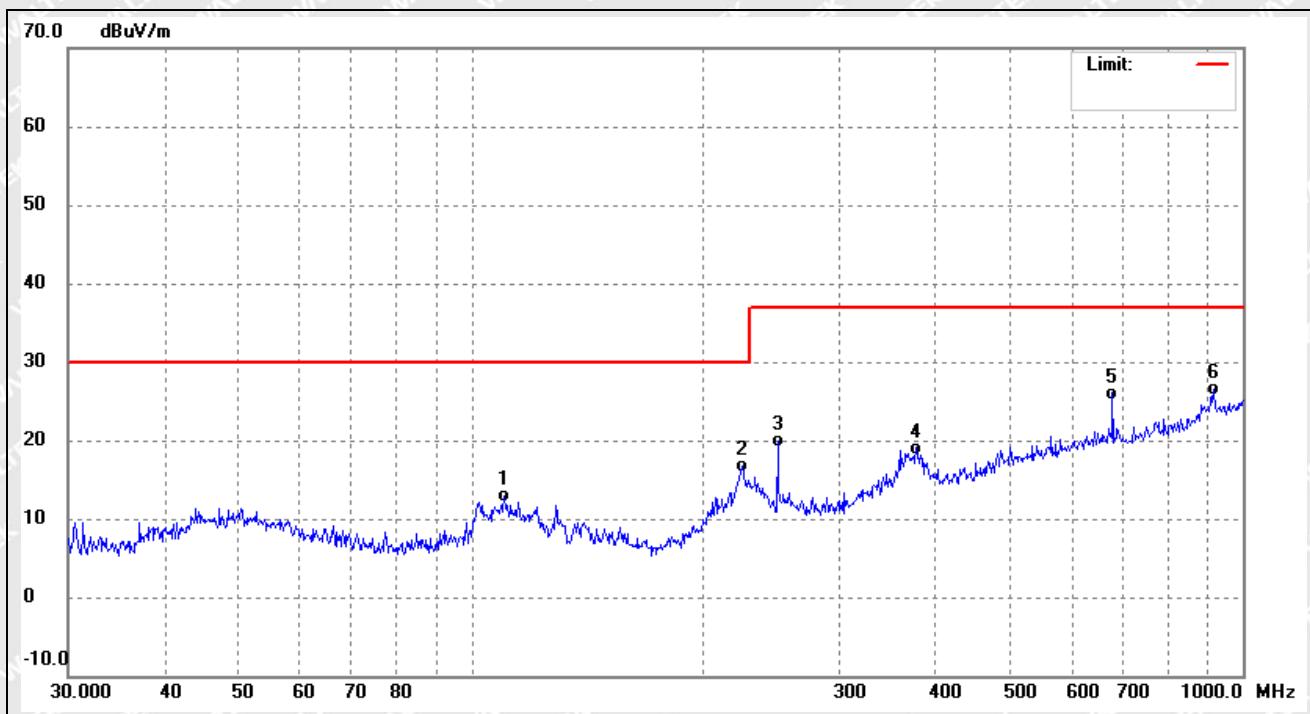
Temperature:	22.7 °C
Relative Humidity:	42.8%
ATM Pressure:	1011 mbar

4.4 Summary of Test Results/Plots

Note: Only show the worst case in the test report

➤ 30MHz to 1GHz

Test mode:	TM1	Polarity:	Horizontal
------------	-----	-----------	------------



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	110.1816	25.27	-12.45	12.82	30.00	-17.18	-	-	QP
2	224.5193	31.03	-14.25	16.78	30.00	-13.22	-	-	QP
3	249.4250	32.98	-13.02	19.96	37.00	-17.04	-	-	QP
4	377.2591	28.57	-9.57	19.00	37.00	-18.00	-	-	QP
5	677.5798	28.05	-2.05	26.00	37.00	-11.00	-	-	QP
6	916.0687	25.88	0.62	26.50	37.00	-10.50	-	-	QP

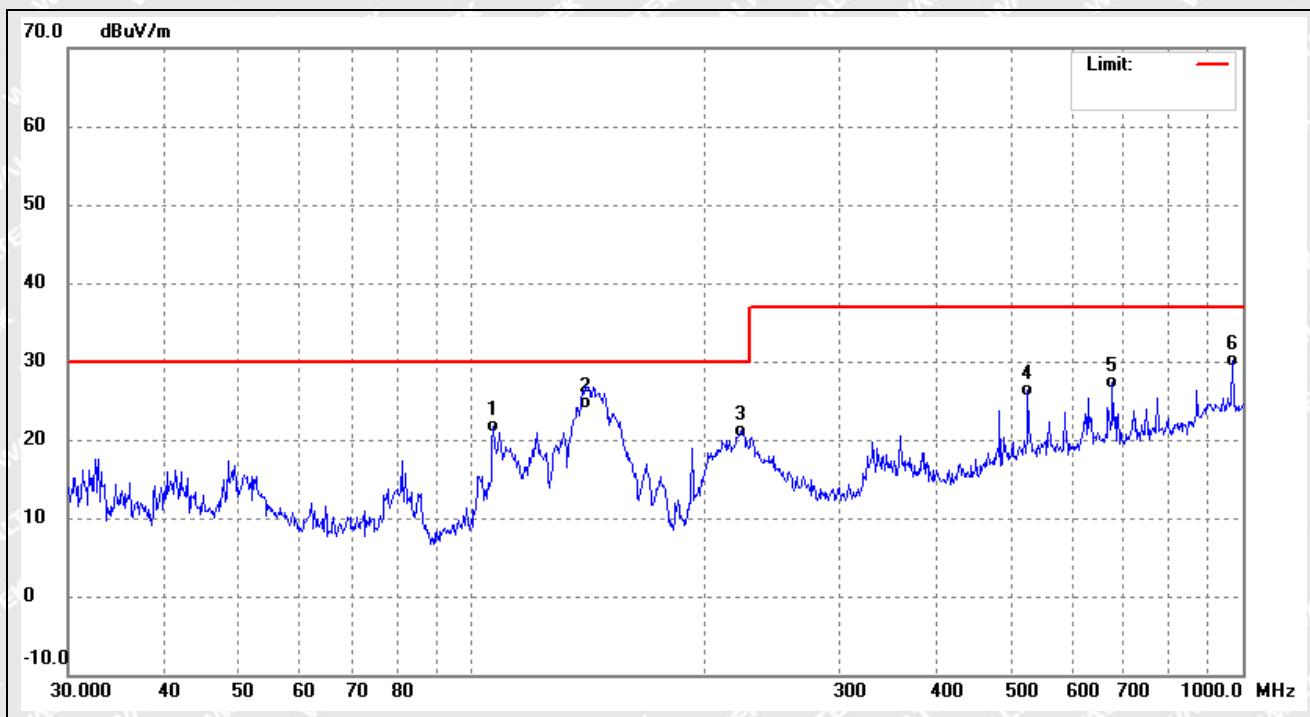


Test mode:

TM1

Polarity:

Vertical

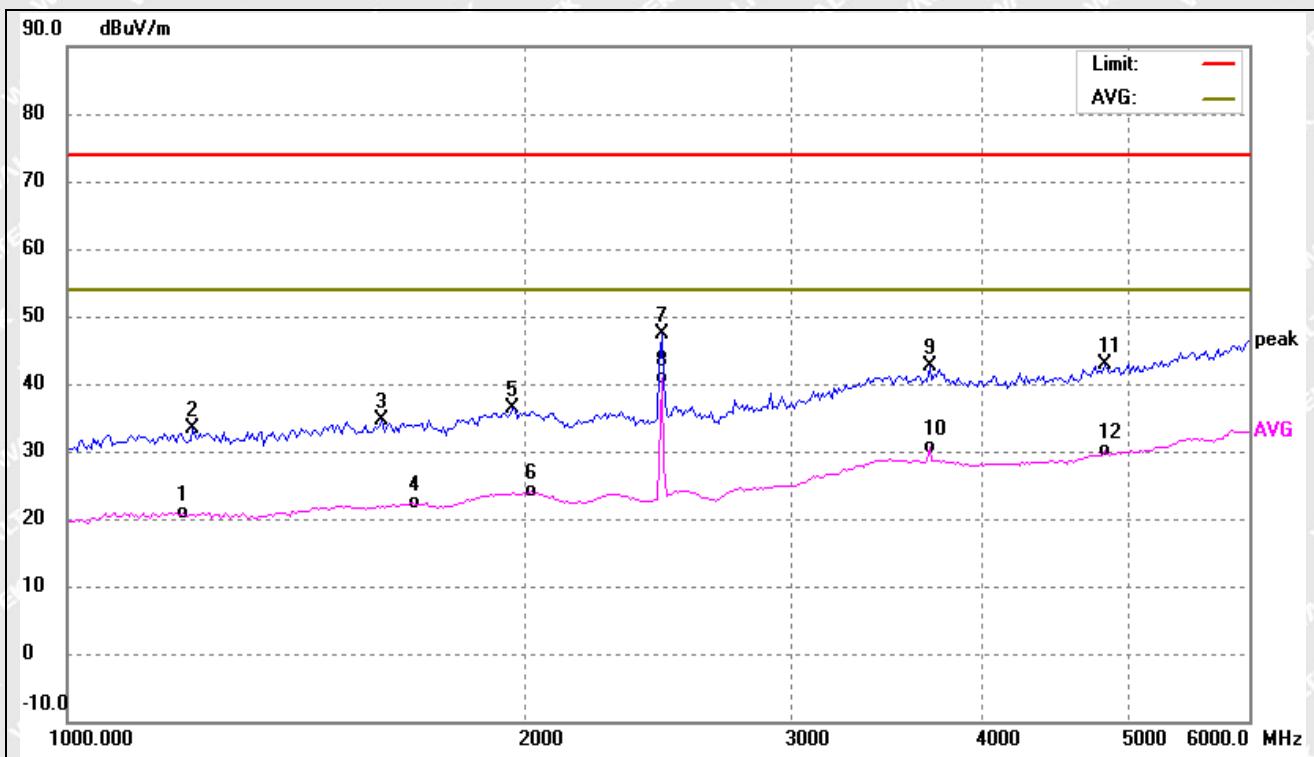


No.	Frequency (MHz)	Reading (dB _{UV} /m)	Correct dB/m	Result (dB _{UV} /m)	Limit (dB _{UV} /m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	106.7587	34.33	-12.67	21.66	30.00	-8.34	-	-	QP
2	140.3421	41.64	-16.94	24.70	30.00	-5.30	-	-	QP
3	223.7333	35.38	-14.26	21.12	30.00	-8.88	-	-	QP
4	526.3967	32.21	-5.85	26.36	37.00	-10.64	-	-	QP
5	677.5798	29.26	-2.05	27.21	37.00	-9.79	-	-	QP
6	968.9337	29.15	0.97	30.12	37.00	-6.88	-	-	QP

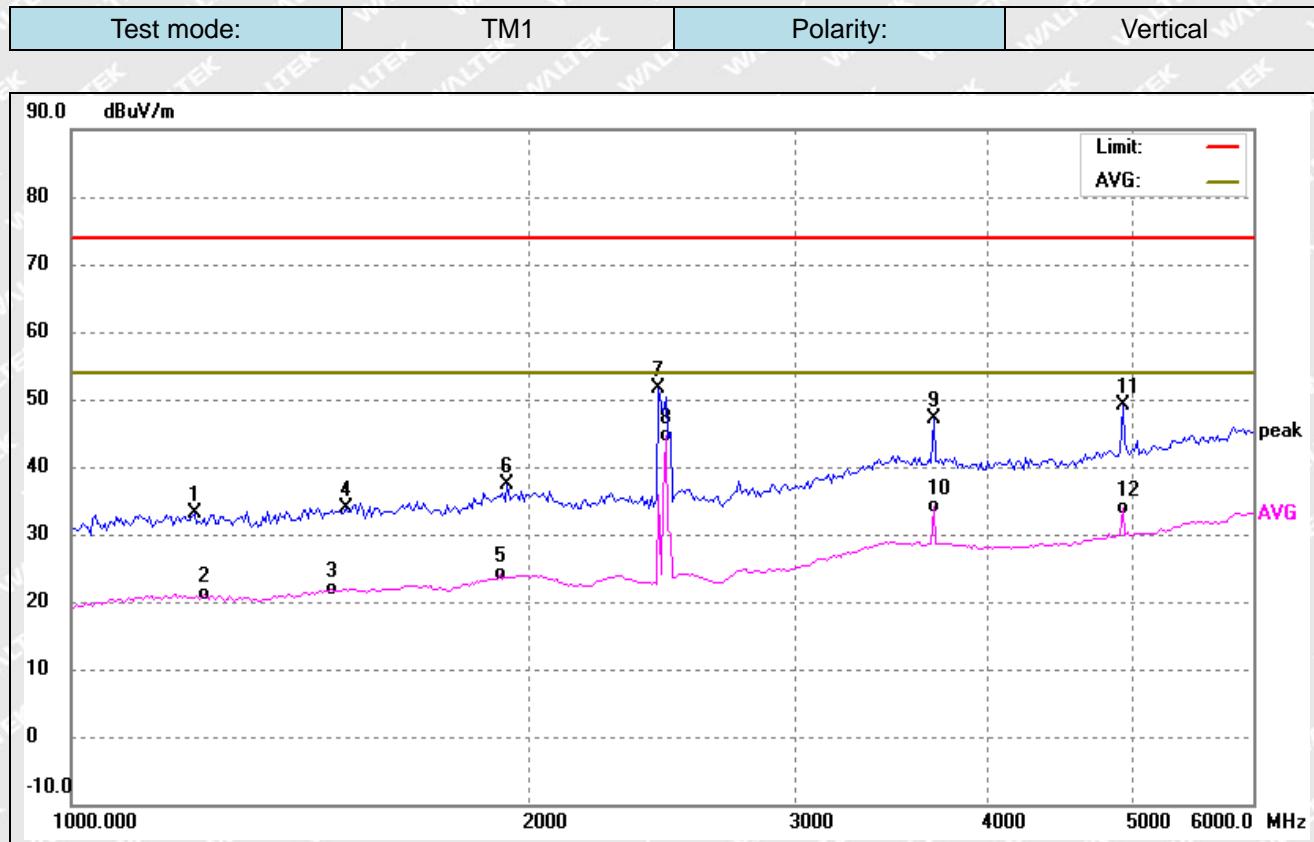


➤ Above 1GHz

Test mode:	TM1	Polarity:	Horizontal
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	1192.372	44.75	-23.77	20.98	54.00	-33.02	-	-	AVG
2	1209.621	57.15	-23.68	33.47	74.00	-40.53	-	-	peak
3	1612.141	56.87	-22.28	34.59	74.00	-39.41	-	-	peak
4	1689.178	44.17	-21.89	22.28	54.00	-31.72	-	-	AVG
5	1964.134	56.84	-20.54	36.30	74.00	-37.70	-	-	peak
6	2021.374	44.32	-20.31	24.01	54.00	-29.99	-	-	AVG
7	2462.718	66.75	-19.33	47.42	74.00	-26.58	-	-	peak
8	2462.718	60.20	-19.33	40.87	54.00	-13.13	-	-	AVG
9	3695.127	57.76	-15.01	42.75	74.00	-31.25	-	-	peak
10	3695.127	45.61	-15.01	30.60	54.00	-23.40	-	-	AVG
11	4819.773	56.26	-13.49	42.77	74.00	-31.23	-	-	peak
12	4819.773	43.64	-13.49	30.15	54.00	-23.85	-	-	AVG



No.	Frequency (MHz)	Reading (dB μ V/m)	Correct dB/m	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	1205.285	56.76	-23.69	33.07	74.00	-40.93	-	-	peak
2	1222.722	44.65	-23.64	21.01	54.00	-32.99	-	-	AVG
3	1484.350	44.85	-22.91	21.94	54.00	-32.06	-	-	AVG
4	1516.676	56.74	-22.80	33.94	74.00	-40.06	-	-	peak
5	1915.381	44.86	-20.78	24.08	54.00	-29.92	-	-	AVG
6	1936.126	57.94	-20.68	37.26	74.00	-36.74	-	-	peak
7	2436.332	71.09	-19.39	51.70	74.00	-22.30	-	-	peak
8	2462.718	63.98	-19.33	44.65	54.00	-9.35	-	-	AVG
9	3695.127	62.24	-15.01	47.23	74.00	-26.77	-	-	peak
10	3695.127	49.18	-15.01	34.17	54.00	-19.83	-	-	AVG
11	4924.737	62.49	-13.37	49.12	74.00	-24.88	-	-	peak
12	4924.737	47.33	-13.37	33.96	54.00	-20.04	-	-	AVG

Remark: '-'Means' the test Degree and Height are not recorded by the test software and only show the worst case in the test report.

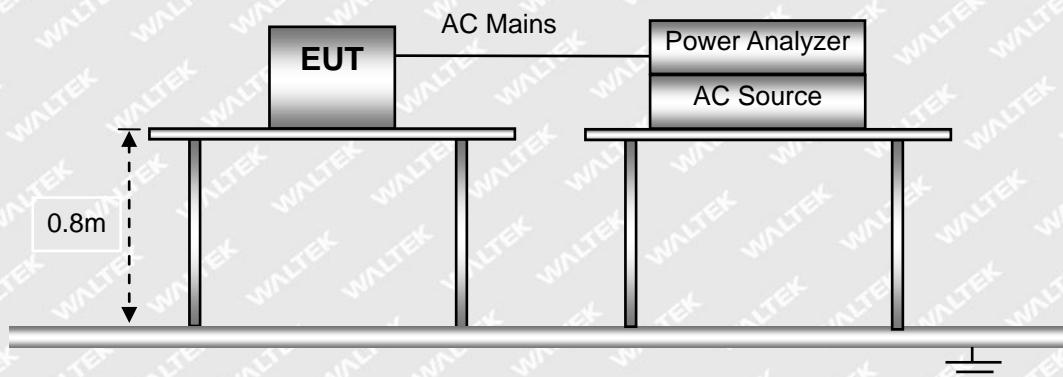


5. Harmonic Current Emissions

5.1 Test Procedure

Test is conducting under the description of EN IEC 61000-3-2.

5.2 Test Setup Block Diagram



5.3 Test Standards

EN IEC 61000-3-2, Clause 7.2 Limits for Class A equipment.

5.4 Environmental Conditions

Temperature:	26 °C
Relative Humidity:	55%
ATM Pressure:	1015 mbar

5.5 Harmonic Current Emissions Test Data



Harmonics – Class-A

Test category: Class-A (European limits)

Test date: 2025/1/16

Start time: 13:50:18

Test Margin: 100

End time: 13:52:59

Test duration (min): 2.5

Data file name: H-000139.cts_data

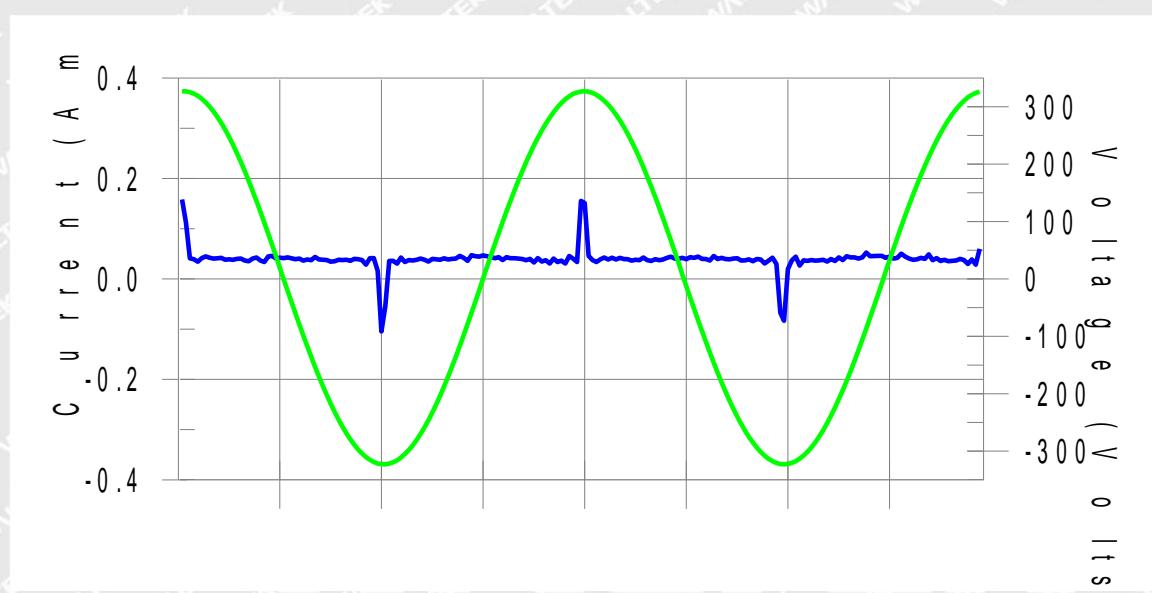
Comment: TM1

Customer: Customer information

Test Result: Pass

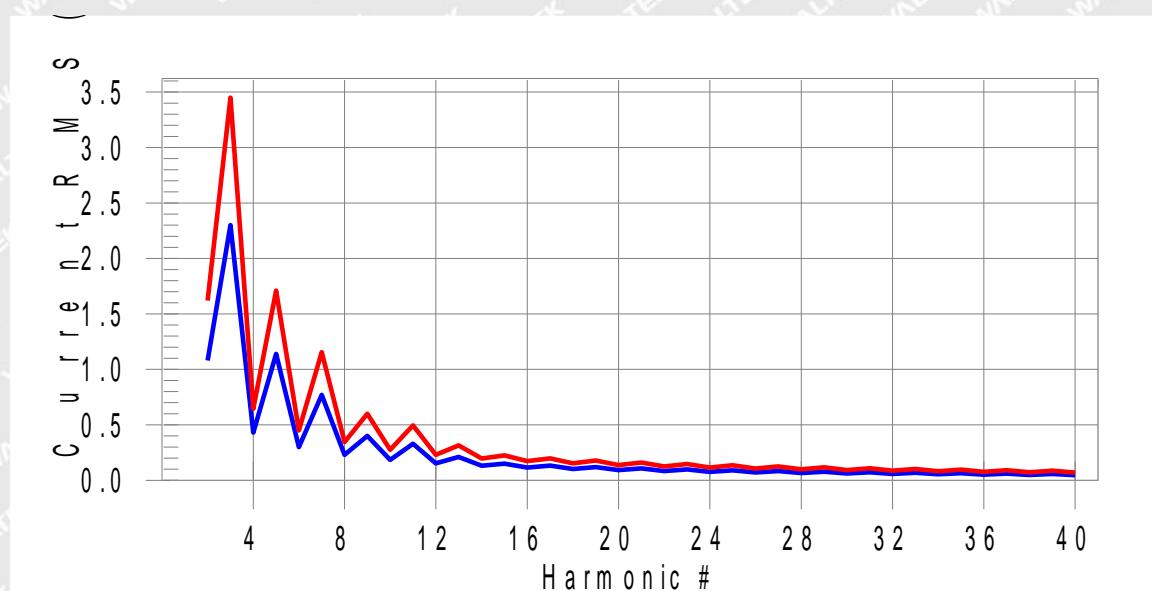
Source qualification: Normal

Current & voltage waveforms



Harmonics and Class A limit line

European Limits



Test result: Pass

Worst harmonics H0-0.0% of 150% limit, H0-0% of 100% limit

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Current Test Result Summary (Run time)

Test category: Class-A (European limits)

Test Margin: 100

Test date: 2025/1/16

Start time: 13:50:18

End time: 13:52:59

Test duration (min): 2.5

Data file name: H-000139.cts_data

Comment: TM1

Customer: Customer information

Test Result: Pass

Source qualification: Normal

THC(A): 0.006

I-THD(%): 196.1

POHC(A): 0.003

POHC Limit(A): 0.251

Highest parameter values during test:

V_RMS (Volts): 229.87

Frequency(Hz): 50.00

I_Peak (Amps): 0.190

I_RMS (Amps): 0.042

I_Fund (Amps): 0.003

Crest Factor: 4.576

Power (Watts): 0.9

Power Factor: 0.113

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.001	1.080	N/A	0.001	1.620	N/A	Pass
3	0.002	2.300	N/A	0.003	3.450	N/A	Pass
4	0.001	0.430	N/A	0.001	0.645	N/A	Pass
5	0.002	1.140	N/A	0.002	1.710	N/A	Pass
6	0.000	0.300	N/A	0.000	0.450	N/A	Pass
7	0.002	0.770	N/A	0.003	1.155	N/A	Pass
8	0.000	0.230	N/A	0.000	0.345	N/A	Pass
9	0.002	0.400	N/A	0.002	0.600	N/A	Pass
10	0.000	0.184	N/A	0.000	0.276	N/A	Pass
11	0.002	0.330	N/A	0.002	0.495	N/A	Pass
12	0.000	0.153	N/A	0.000	0.230	N/A	Pass
13	0.002	0.210	N/A	0.002	0.315	N/A	Pass
14	0.000	0.131	N/A	0.000	0.197	N/A	Pass
15	0.002	0.150	N/A	0.002	0.225	N/A	Pass
16	0.000	0.115	N/A	0.000	0.173	N/A	Pass
17	0.001	0.132	N/A	0.002	0.198	N/A	Pass
18	0.000	0.102	N/A	0.000	0.153	N/A	Pass
19	0.001	0.118	N/A	0.002	0.178	N/A	Pass
20	0.000	0.092	N/A	0.000	0.138	N/A	Pass
21	0.001	0.107	N/A	0.002	0.161	N/A	Pass
22	0.000	0.084	N/A	0.000	0.125	N/A	Pass
23	0.001	0.098	N/A	0.002	0.147	N/A	Pass
24	0.000	0.077	N/A	0.000	0.115	N/A	Pass
25	0.001	0.090	N/A	0.002	0.135	N/A	Pass



26	0.000	0.071	N/A	0.000	0.107	N/A	Pass
27	0.001	0.083	N/A	0.002	0.125	N/A	Pass
28	0.000	0.066	N/A	0.000	0.099	N/A	Pass
29	0.001	0.078	N/A	0.001	0.116	N/A	Pass
30	0.000	0.061	N/A	0.000	0.092	N/A	Pass
31	0.001	0.073	N/A	0.001	0.109	N/A	Pass
32	0.000	0.058	N/A	0.000	0.086	N/A	Pass
33	0.001	0.068	N/A	0.001	0.102	N/A	Pass
34	0.000	0.054	N/A	0.000	0.081	N/A	Pass
35	0.001	0.064	N/A	0.001	0.096	N/A	Pass
36	0.000	0.051	N/A	0.000	0.077	N/A	Pass
37	0.001	0.061	N/A	0.001	0.091	N/A	Pass
38	0.000	0.048	N/A	0.000	0.073	N/A	Pass
39	0.001	0.058	N/A	0.001	0.087	N/A	Pass
40	0.000	0.046	N/A	0.000	0.069	N/A	Pass

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Voltage Source Verification Data (Run time)

Test category: Class-A (European limits)

Test Margin: 100

Test date: 2025/1/16

Start time: 13:50:18

End time: 13:52:59

Test duration (min): 2.5

Data file name: H-000139.cts_data

Comment: TM1

Customer: Customer information

Test Result: Pass

Source qualification: Normal

Highest parameter values during test:

Voltage (Vrms):	229.87	Frequency(Hz):	50.00
I_Peak (Amps):	0.190	I_RMS (Amps):	0.042
I_Fund (Amps):	0.003	Crest Factor:	4.576
Power (Watts):	0.9	Power Factor:	0.113

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.050	0.460	10.96	OK
3	0.505	2.068	24.39	OK
4	0.076	0.460	16.45	OK
5	0.063	0.919	6.89	OK
6	0.036	0.460	7.93	OK
7	0.024	0.689	3.45	OK
8	0.017	0.460	3.63	OK
9	0.010	0.460	2.12	OK
10	0.010	0.460	2.22	OK
11	0.010	0.230	4.28	OK
12	0.011	0.230	4.58	OK
13	0.013	0.230	5.68	OK
14	0.006	0.230	2.50	OK
15	0.010	0.230	4.52	OK
16	0.007	0.230	3.21	OK
17	0.013	0.230	5.78	OK
18	0.012	0.230	5.02	OK
19	0.010	0.230	4.15	OK
20	0.015	0.230	6.60	OK
21	0.007	0.230	3.23	OK
22	0.004	0.230	1.59	OK
23	0.005	0.230	2.04	OK
24	0.003	0.230	1.37	OK
25	0.006	0.230	2.62	OK
26	0.003	0.230	1.14	OK



27		0.008	0.230	3.47	OK
28		0.004	0.230	1.84	OK
29		0.008	0.230	3.31	OK
30		0.004	0.230	1.53	OK
31		0.007	0.230	2.86	OK
32		0.003	0.230	1.21	OK
33		0.004	0.230	1.82	OK
34		0.002	0.230	0.94	OK
35		0.004	0.230	1.69	OK
36		0.002	0.230	0.91	OK
37		0.006	0.230	2.44	OK
38		0.002	0.230	0.95	OK
39		0.005	0.230	2.26	OK
40		0.008	0.230	3.28	OK

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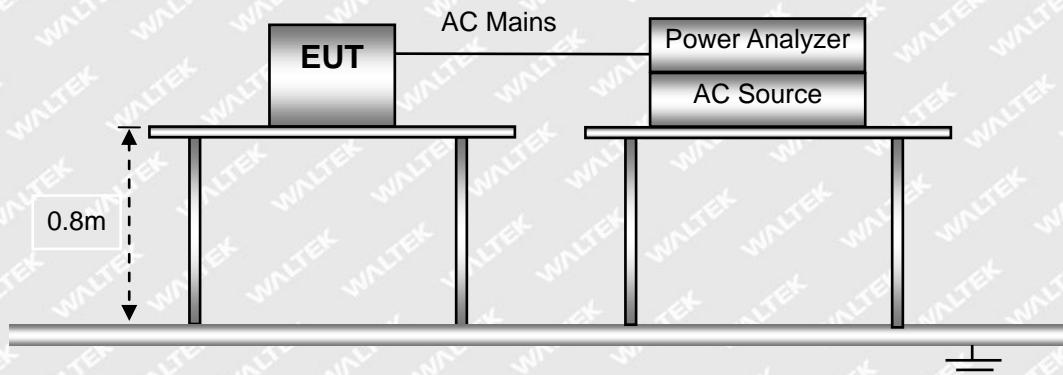


6. Voltage Fluctuation and Flicker

6.1 Test Procedure

Test is conducting under the description of EN 61000-3-3.

6.2 Test Setup Block Diagram



6.3 Test Standards

EN 61000-3-3, Limit: Clause 5.

6.4 Environmental Conditions

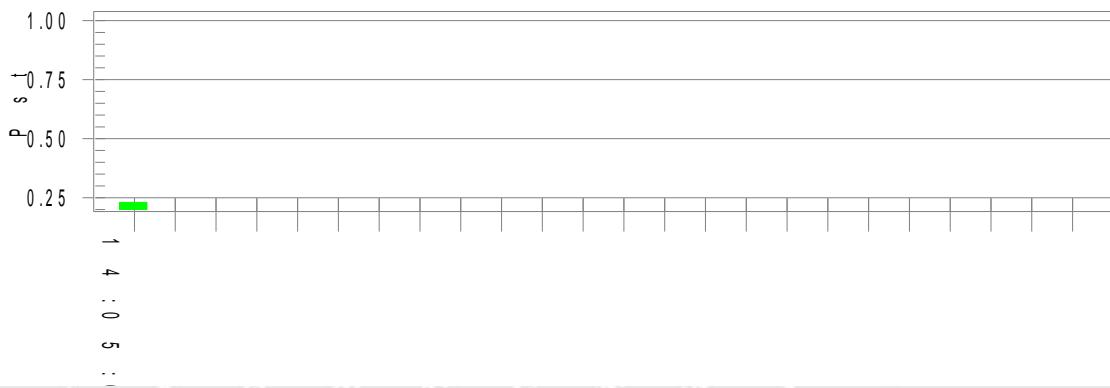
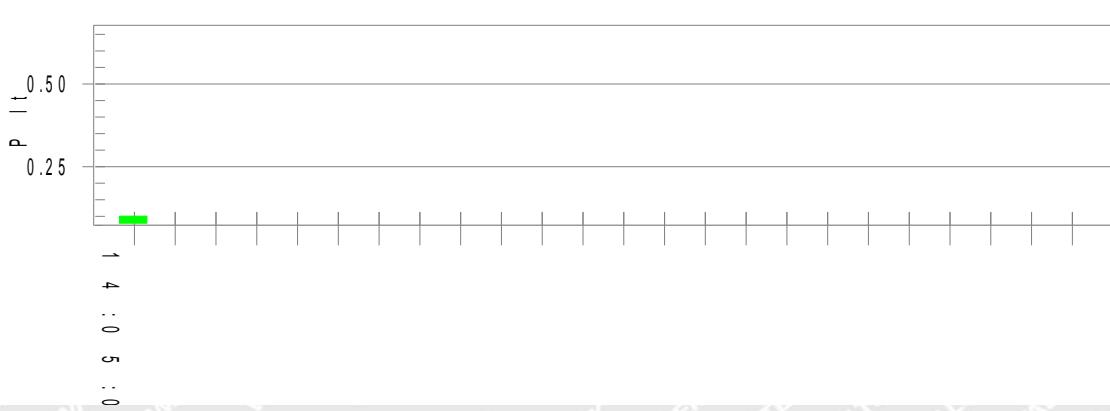
Temperature:	26 °C
Relative Humidity:	55%
ATM Pressure:	1015 mbar

6.5 Voltage Fluctuation and Flicker Test Data



Test mode:

TM1(worst case)

Test Result: Pass**Status: Test Completed****Pst_i and limit line****European Limits****Plt and limit line****Parameter values recorded during the test:**

Vrms at the end of test (Volt): 229.82

T-max (mS):	0	Test limit (mS):	500.0	Pass
Highest dc (%):	0.00	Test limit (%):	3.30	Pass
Highest dmax (%):	0.00	Test limit (%):	4.00	Pass
Highest Pst (10 min. period):	0.230	Test limit:	1.000	Pass
Highest Plt (2 hr. period):	0.101	Test limit:	0.650	Pass

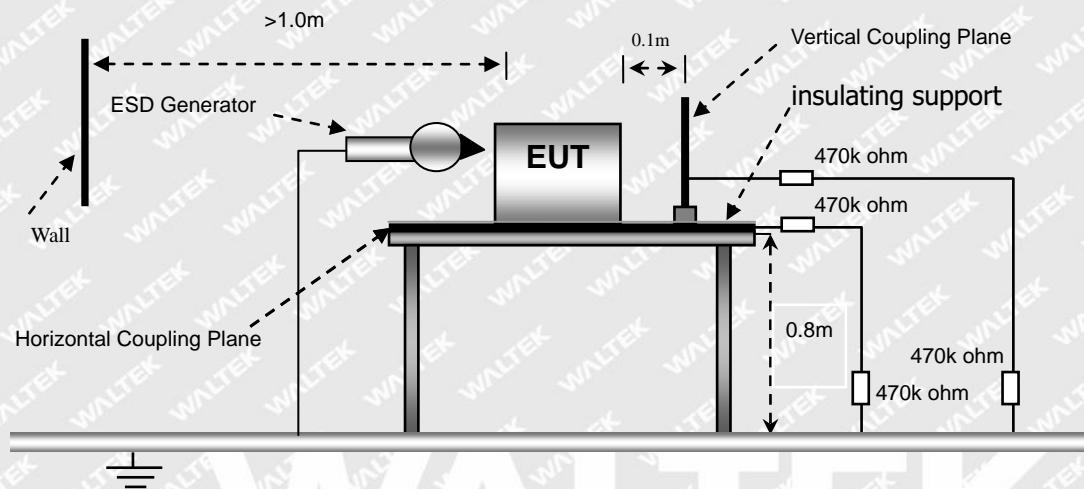


7. Electrostatic Discharge (ESD)

7.1 Test Procedure

Test is conducting under the description of EN 61000-4-2.

7.2 Test Setup Block Diagram



7.3 Test Performance

Required Performance Criterion:	B
Mode:	TM1-TM7
Note: TM2-TM7 for TT,TR	

7.4 Environmental Conditions

Temperature:	26 °C
Relative Humidity:	55%
ATM Pressure:	1011 mbar

7.5 Electrostatic Discharge Immunity Test Data



Test mode	TM1-TM7							
EN 61000-4-2 Test Points	Test Levels (kV)							
	-2	+2	-4	+4	-6	+6	-8	+8
Air Discharge								
Gap	A	A	A	A	A	A	A	A
Port	A	A	A	A	A	A	A	A
Enclosure	A	A	A	A	A	A	A	A
Direct Contact Discharge								
/	/	/	/	/	/	/	/	/
Indirect Contact Discharge								
HCP (6 Sides)	A	A	A	A	/	/	/	/
VCP (4 Sides)	A	A	A	A	/	/	/	/

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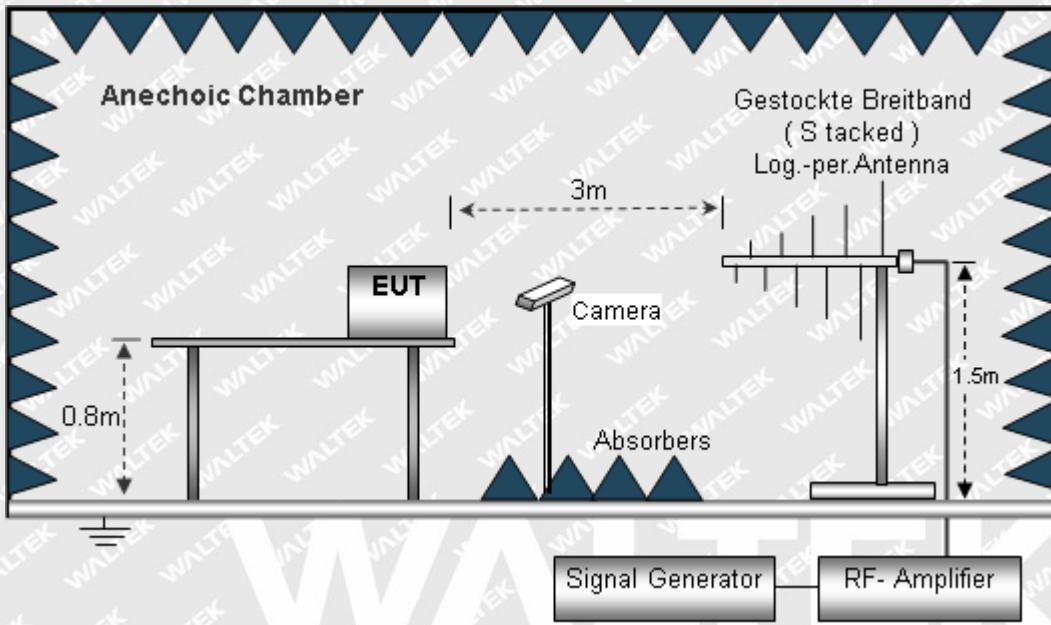


8. Radio Frequency Electromagnetic Field (R/S)

8.1 Test Procedure

Test is conducting under the description of EN 61000-4-3.

8.2 Test Setup Block Diagram



8.3 Test Performance

Required Performance Criterion:	A
Mode:	TM1-TM7
Note: TM2-TM7 for CT,CR	

8.4 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1010 mbar

8.5 Continuous Radiated Disturbances Test Data

Frequency step: 1% of fundamental

Dwell time: 1 second

Modulation: AM by 1kHz sine wave with 80% modulation depth



Test mode		TM1-TM7							
Frequency Range(MHz)	Field (V/m)	Front		Rear		Left Side		Right Side	
		VERT	HORI	VERT	HORI	VERT	HORI	VERT	HORI
80-1000	3	A	A	A	A	A	A	A	A
1000-3000	3	A	A	A	A	A	A	A	A
3000-6000	3	A	A	A	A	A	A	A	A

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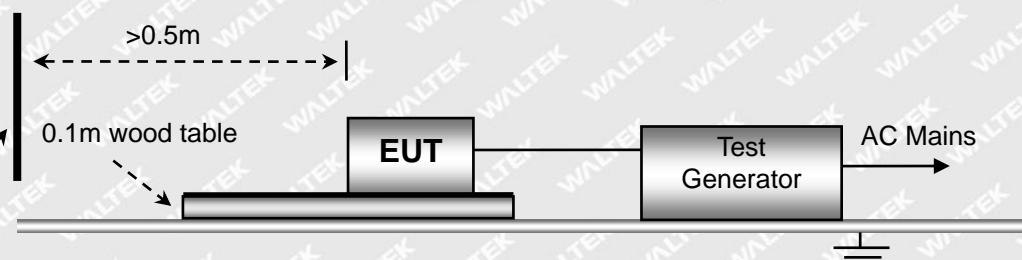
9. Fast Transients, Common Mode (EFT)

9.1 Test Procedure

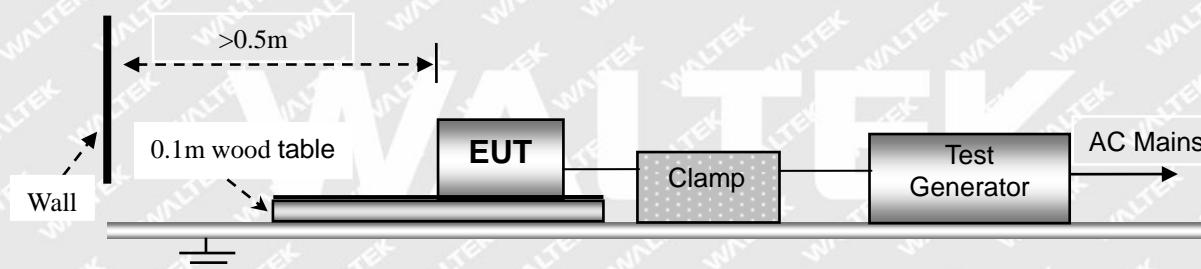
Test is conducting under the description of EN 61000-4-4.

9.2 Test Setup Block Diagram

For AC Mains or DC Ports:



For Signal or Telecommunication Ports:



9.3 Test Performance

Required Performance Criterion:	B
Mode:	TM1-TM7
Note: TM2-TM7 for TT,TR	

9.4 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	53%
ATM Pressure:	1011 mbar

9.5 Electrical Fast Transients Test Data



Test Mode		TM1-TM7							
EN 61000-4-4 Test Line		Test Levels (kV)							
		+0.5	-0.5	+1.0	-1.0	+2.0	-2.0	+4.0	-4.0
AC Main Power port	L	A	A	A	A	/	/	/	/
	N	A	A	A	A	/	/	/	/
	PE	/	/	/	/	/	/	/	/
	L-N	A	A	A	A	/	/	/	/
	L-PE	/	/	/	/	/	/	/	/
	N-PE	/	/	/	/	/	/	/	/
	L-N-PE	/	/	/	/	/	/	/	/
Signal ports	/	/	/	/	/	/	/	/	/

WALTEK



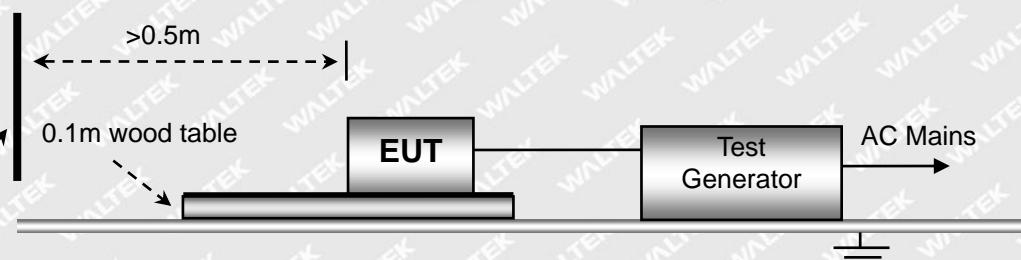
10. Surges

10.1 Test Procedure

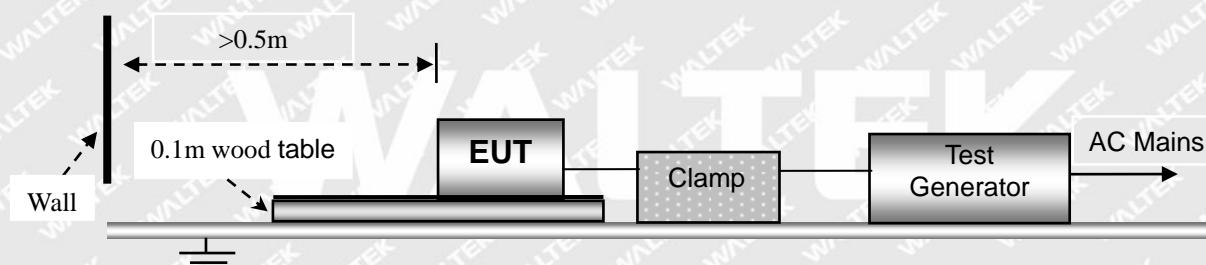
Test is conducting under the description of EN 61000-4-5.

10.2 Test Setup Block Diagram

For AC Mains or DC Ports:



For Signal or Telecommunication Ports:



10.3 Test Performance

Required Performance Criterion:	B
Mode:	TM1-TM7
Note: TM2-TM7 for TT,TR	

10.4 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	53%
ATM Pressure:	1011 mbar

10.5 Surge Test Data



Test Mode	TM1-TM7			
Voltage	Poll	Path	Pass	Fail
0.5kV	±	L-N	A	/
1kV	±	L-N	A	/
2kV	±	L-N, L-PE, N-PE	/	/
4kV	±	L-N, L-PE, N-PE	/	/

WALTEK



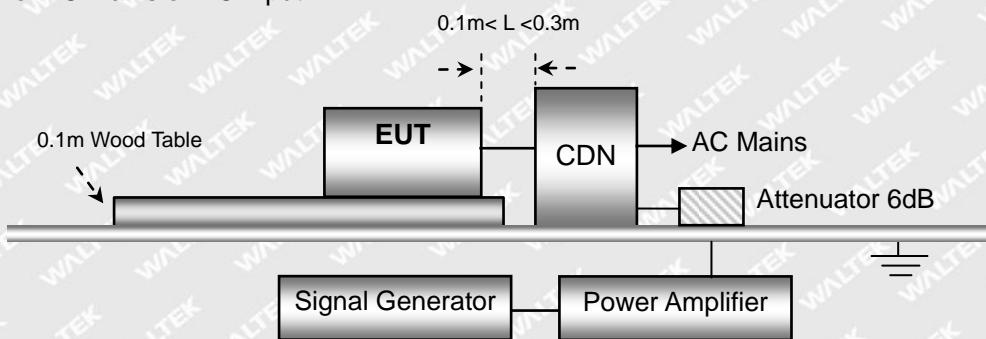
11. Radio Frequency, Common Mode (C/S)

11.1 Test Procedure

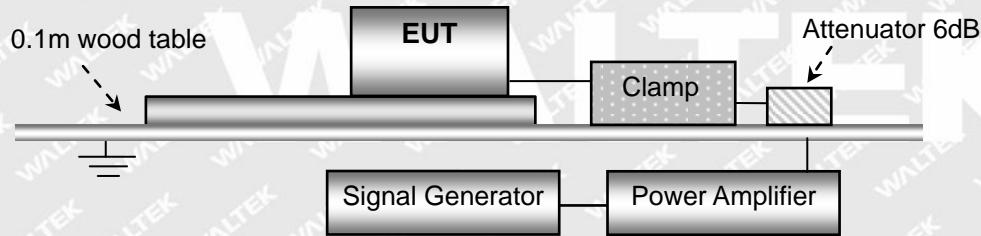
Test is conducting under the description of EN 61000-4-6.

11.2 Test Setup Block Diagram

For AC Mains or DC Input:



For Signal or Telecommunication Ports:



11.3 Test Performance

Required Performance Criterion:	A
Mode:	TM1-TM7
Note: TM2-TM7 for CT,CR	

11.4 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	53%
ATM Pressure:	1011 mbar

11.5 Continuous Conducted Disturbances Test Data

Sweep frequency range: 150kHz~80MHz

Frequency step: 1% of fundamental

Dwell time: 1 second



Test Mode		TM1-TM7		
Level	Voltage (V) (rms, unmodulated)	Modulation:	Pass	Fail
1	1	AM 80%, 1kHz sinewave	/	/
2	3	AM 80%, 1kHz sinewave	A	/
3	10	AM 80%, 1kHz sinewave	/	/
X	Special	/	/	/

WALTEK

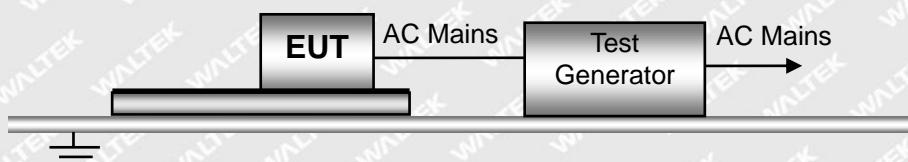


12. Voltage Dips and Interruptions

12.1 Test Procedure

Test is conducting under the description of EN 61000-4-11.

12.2 Test Setup Block Diagram



12.3 Test Performance

Required Performance Criterion:	B for voltage dip/ C for voltage interruption
Mode:	TM1-TM7
Note: TM2-TM7 for TT,TR	

12.4 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	50%
ATM Pressure:	1011 mbar

12.5 Voltage Dips And Interruptions Test Data

U: Voltage dips in % U_T (U_T is rated voltage for the EUT)

T: Test duration

Level	U	T	Phase Angle	N	Pass	Fail
1	100%	10ms	0/90/180/270	3	A	/
2	100%	20ms	0/90/180/270	3	B	/
3	30%	500ms	0/90/180/270	3	B	/
4	100%	5000ms	0/90/180/270	3	C	/

Test Result: Pass



EXHIBIT 1 - EUT PHOTOGRAPHS

Please refer to "ANNEX".

WALTEK

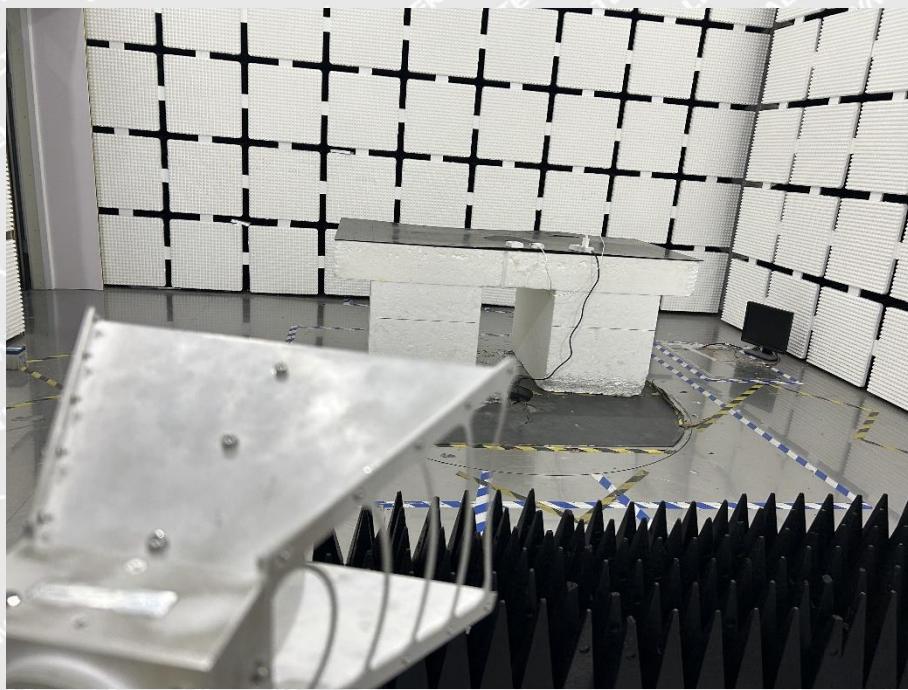


EXHIBIT 2 - TEST SETUP PHOTOGRAPHS

<p>Conducted Emission Test Setup</p>	 A photograph showing the conducted emission test setup. It includes a white test chamber on the left, a control unit with a keypad and display in the center, and a large metal chassis with various components and cables on the right. The setup is located in a room with a wooden floor and a black wall.
<p>Radiation Emission Test View(30MHz to 1GHz)</p>	 A photograph of the radiation emission test view. The scene is a large anechoic chamber with white, reflective panels forming a grid pattern on the walls. A blue rectangular object is positioned in the center. The floor is made of polished metal, and a small wooden table is visible in the background.



**Radiation Emission
Test Setup ((Above
1GHz))**



**Harmonic/Flicker Test
View**

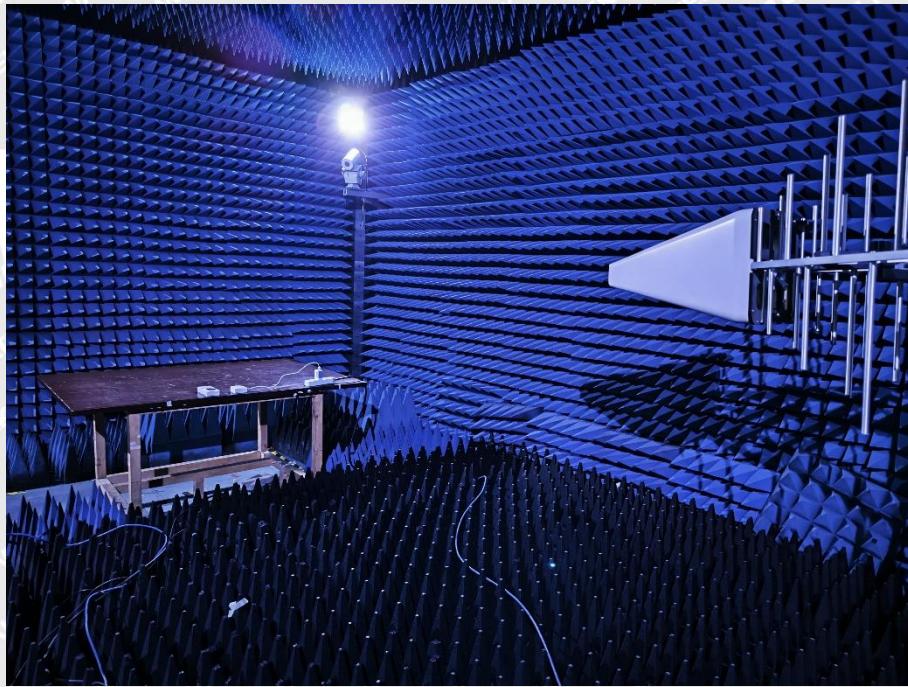




EN 61000-4-2 Test View



EN 61000-4-3 Test View





Reference No.: WTX24X12296736W009

**EN 61000-4-4/5/11 Test
View**



EN 61000-4-6 Test View



***** END OF REPORT *****